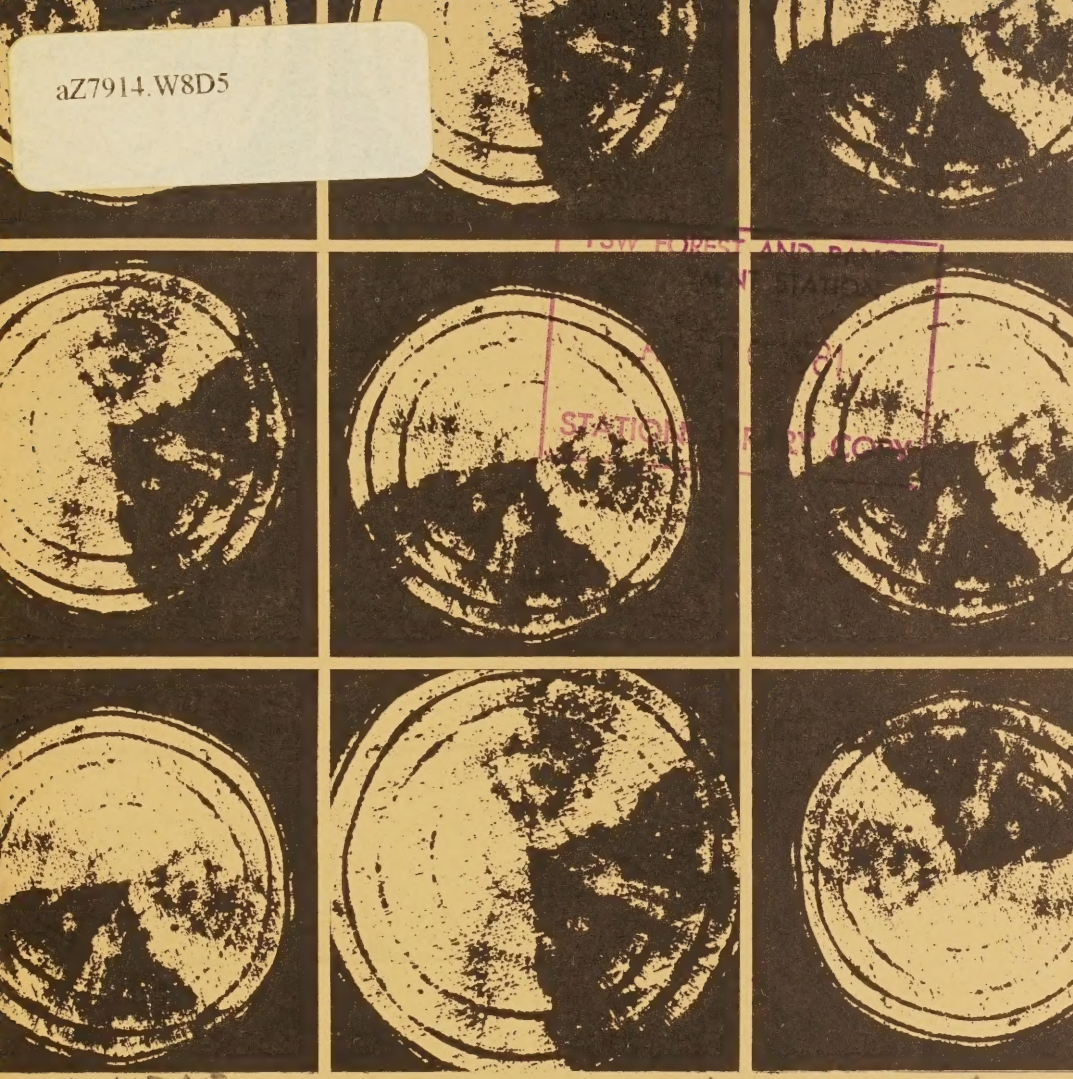


DIVIDENDS FROM WOOD RESEARCH

RECENT PUBLICATIONS
OF THE
FOREST PRODUCTS LABORATORY
FOREST SERVICE
USDA

1975

Many dividends come from wood research, but the most lasting one is research information put into practice. The first step in that sometimes lengthy path is publication of the research findings.

Here are some recent publications of the Forest Products Laboratory. Those of general interest to a broad audience are listed first. Others that are highly technical and of interest mainly to other research scientists are listed toward the rear.

If you are interested in some of these publications, please request them on the back cover of this booklet. You may be the vital link in getting the dividends of wood research into use.

H.O. Fleischer
Director, FPL

WOOD...

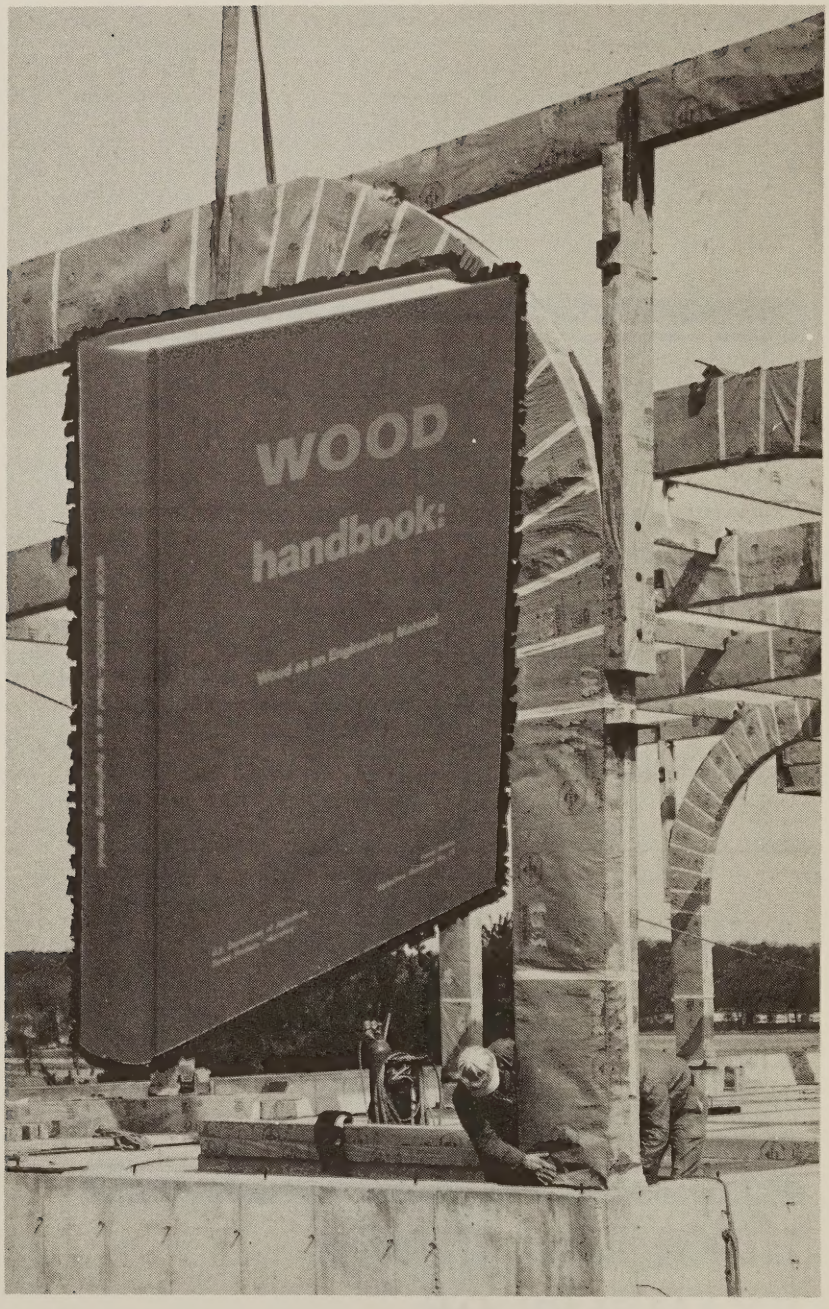
EVER-NEW ANSWER TO TODAY'S MATERIALS PROBLEMS:

Renewable resource
Requires low energy to process
Low pollution rate
Familiar material to handlers and users
Strong and beautiful

AND WOOD RESEARCH

is the Key
To More Efficient Use
Of This Versatile Material

HERE ARE SOME EXAMPLES OF FPL RESULTS


WOOD
handbook:
Wood as an Engineering Material

WOOD HANDBOOK: WOOD AS AN ENGINEERING MATERIAL

By Forest Products Laboratory.
USDA Agriculture Handbook 72
432 pp. Rev. 1974.

Throughout the years, practical knowledge of wood has resulted in strong and beautiful structures, although exact engineering data were not always available. In these days when the Nation is attempting to use its resources more fully, better and more efficient use of the timber crop is vital.

The Wood Handbook provides information that allows wood to be used more efficiently. It is the summation of information collected for more than six decades by the Forest Products Laboratory, and includes the accumulation of data on wood as an engineering material.

The Handbook provides engineers, architects, builders, and others a source for information on the physical and the mechanical properties of wood and their application to structural use. In addition, how wood handling affects its usefulness is explained. Descriptions are given of the principles of wood drying, fastening, finishing, gluing, and preserving from degradation.

Both wood and wood-base products are described in the book's 22 chapters.

Because of the cost of this handbook, free copies cannot be distributed. It is available for $7.85 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

CONDENSATION PROBLEMS IN YOUR HOUSE: PREVENTION AND SOLUTION

By L.O. Anderson and G.E. Sherwood.
USDA Agricultural Information
Bulletin 373. Sept. 1974.

Installing vapor barriers, insulation, and adequate ventilation can dramatically improve the performance of a house and at the same time conserve the Nation's energy.

The basic problem dealt with is excessive moisture that condenses in a house. If the insulation becomes wet, more of the heat to warm the house will be wasted. Condensation of water vapor on the back of siding can result in streaked or peeling paint, and may help decay organisms survive.

The results of many years of research by the Forest Products Laboratory and by other scientists, plus field experience in solving condensation problems, have provided valuable information. This publication contains recommendations based on the research findings. Described and illustrated are good practices in the use of vapor barriers, insulation, ventilation, and other construction details.

Following the recommended practices in building a new house can pay for itself many times over in reduced maintenance costs.

This Bulletin is available for 75 cents from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402

1

PROPERTIES OF STRUCTURAL PARTICLEBOARDS FROM DOUGLAS-FIR FOREST RESIDUES

By W.F. Lehmann and R.L. Geimer.
For. Prod. J. 24[10] : 17-25.
Oct. 1974.

Structural, or load-bearing, particleboard can perform as building panels in home construction. Many are the advantages of structural particleboard from forest residues.

Structural particleboard from residues would be advantageous to the housing industry, to the manufacturer, to the builder, to the consumer; would use the timber resource wisely; and would help clean up the environment.

Panels were prepared with various proportions of sound wood, bark, dead wood, decayed wood, and branches of Douglas-fir. Adequate properties were maintained as long as extreme amounts of bark, branchwood, or badly decayed wood were not included in the panels.

This material, from residues with minimal care in selection and combinations, should be an excellent source for the particle types needed to manufacture strong, stable, and durable structural particleboard.

2

TESTING OF A FULL-SCALE HOUSE UNDER SIMULATED SNOWLOADS AND WINDLOADS

By Roger L. Tuomi and William J. McCutcheon.
USDA Forest Service
Research Paper FPL 234. 1974.

House construction offers the greatest single area for potential savings of our timber resource. More than half of the annual softwood harvest of the Nation's forests is used for this construction, yet the structural performance of a full-scale conventionally built house is not well understood.

The objective here was to determine how a full-scale conventional house responded to selected imposed forces. These were limited to horizontal loads on walls and vertical loads on the roof. Racking resistance of walls under concentrated loads during progressive stages of construction also was measured.

The racking resistance of the house proved more than adequate. Weak links were in connections between sole plate and floor, and later at the sill plate.

This important, but limited, information will guide future research to establish design criteria for wood houses.

3

POTENTIALS OF WOOD FOR PRODUCING ENERGY

By John B. Grantham and Thomas H. Ellis.
Journal of Forestry 72[9] : 552-556.
1974.

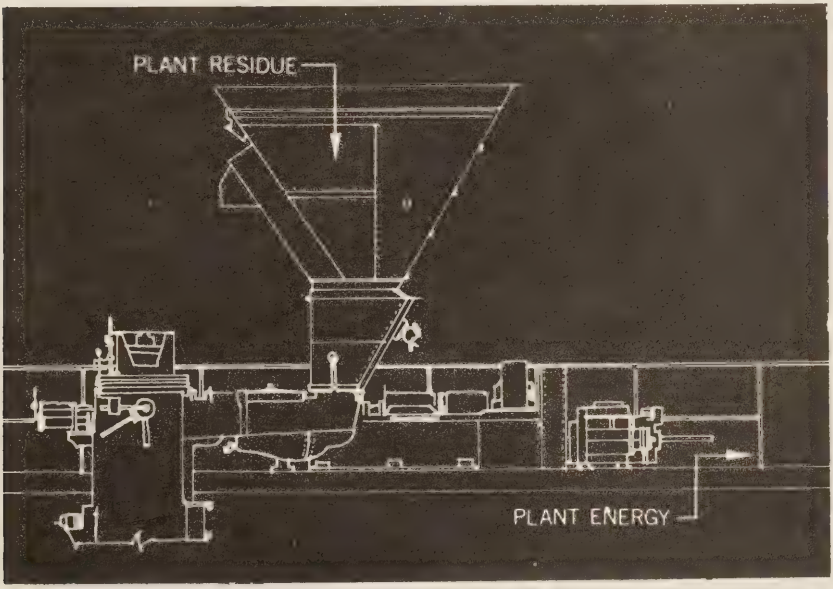
Can wood contribute substantially to our Nation's energy supply?

Is the use of wood as fuel or feedstock technically feasible if compared with coal and other fossil fuels?

What are the values of wood for energy compared to other uses?

These questions are analyzed and answered.

Wood probably will not be a major source of energy for commercial power production or for chemical feedstock. The potential contribution of wood to solve our energy problems is seen to be improvements in timber processing and in efficient design for wood products. Logging residue generally will be too expensive for use as fuel only.



OTHER DIVIDENDS FROM WOOD RESEARCH

Single copies of all publications listed in this booklet are available free (unless designated otherwise) from the Forest Products Laboratory while the supply lasts.

To request publications simply circle the item number on the back cover of this booklet, detach the card, and mail it to the laboratory.

Blanket requests for publications cannot be filled.

Yes keep

We have 0 in stock

Kook

5

DEVELOPMENT IN PARTICLEBOARD AND OTHER COMPOSITE PRODUCTS

By W.R. Lehmann.
Journal of Forestry 72[11] : 706-708.
Nov. 1974.

Growth of few industries compares with the steadily increasing growth of the particleboard industry, from almost nothing to almost 4 billion square feet in 23 years. In fact, together with hardboard and insulation board, the production tonnage equals 28 percent of U.S. lumber tonnage.

This report covers developments in medium fiberboard, continuous pressing of thin panels, and the effects of alining fibers and particles, as well as the potential of structural particleboards from forest residues.

New developments in adhesives for the particleboard industry promise virtual independence of the industry from the petrochemical industry.

This report is the second in a series to provide basic information for establishing design stresses for particleboard.

6

PARTICLEBOARD FROM LODGEPOLE PINE FOREST RESIDUE

By Bruce G. Heebink.
USDA Forest Service
Research Paper FPL 221. 1974.

Production of structural, or load-carrying, particleboard is a possible answer for using the accumulations of logging slash after timber harvest.

Unbarked lodgepole pine forest residue with a minimum diameter of 3 inches was used to produce two types of particleboard: An all-flake board and a flake-faced board with a sliver core. Board composition was analyzed in relation to strength properties.

There should be no technical difficulties in producing acceptable particleboards of these types from lodgepole pine residues.

7

INFLUENCE OF FIBER ALINEMENT ON STIFFNESS AND DIMENSIONAL STABILITY OF HIGH-DENSITY DRY-FORMED HARDBOARD

By Paul E. Steinmetz and Charles W. Polley.
For. Prod. J. 24[5] : 45-50.
May 1974.

Although wood-fiber-based hardboard has been used for years, its use for structural members has been limited. The growing shortage of high-quality knotfree timber increases the need for wood fiberbase structural products that are uniformly strong and better engineered for a particular end use.

This report explains how wood fibers can be formed in various configurations to produce hardboards that will have strengths and stiffnesses in the range of solid wood.

8

PROPERTIES OF PARTICLEBOARDS AT VARIOUS HUMIDITY CONDITIONS

By J. Dobbin McNatt.
USDA Forest Service
Research Paper FPL 225. 1974.

The effects of changes in moisture content on properties of particleboard must be determined for efficient use in structural, or load-carrying, application. This is true particularly if exterior exposure is likely.

Changes in equilibrium moisture content are evaluated for their effects on strength and elastic properties. Conditioning specimens to equilibrium moisture content at 80 to 90 percent relative humidity reduced values for load-carrying capacity and stiffness. These were below values for matched specimens at 30 and 65 percent relative humidity.

9

HOW SPECIES AND BOARD DENSITIES AFFECT PROPERTIES OF EXOTIC HARDWOOD PARTICLEBOARDS

By Benedito Rocha Vital, William F. Lehmann, and R. Sidney Boone.
For. Prod. J. 24[12] : 37-45.
Dec. 1974.

Using mixtures of many species of tropical hardwoods for particleboards, as well as for other wood products, could partially utilize the tropical forests of more than 3 million square miles. A great number of species are found on a given area.

Four tropical hardwood species were investigated by single species and by mixtures of species for their relationship to strength and dimensional stability of particleboards. The results show that species of a wide range of densities may be mixed and will produce acceptable particleboards of several density grades.

An earlier version of this article won the senior author second place in the 1974 Wood Award contest co-sponsored by *Wood and Wood Products* magazine and the Forest Products Research Society.

10

BASIC PROPERTIES OF THREE MEDIUM-DENSITY HARDBOARDS

By Michael J. Superfesky and Wayne C. Lewis.
USDA Forest Service
Research Paper FPL 238. 1974.

To serve as a base to evaluate and compare hardboards from urban waste and forest residue, three commercial medium-density boards were evaluated.

The commercial hardboards, a new type of panel product, are produced by a combination of hot platen pressing and high-frequency heating to cure the resin and effect a bond in the panel.

The properties of all three boards were quite similar, particularly in flexure, tension, and compression. Many evaluations were made both parallel and perpendicular to the panel length; results showed that properties did not differ significantly in these two directions.

11

CROSS-GRAIN CUTTING WITH SEGMENTED HELICAL CUTTERS PRODUCES GOOD SURFACES AND FLAKES

By Harold A. Stewart and William F. Lehmann.
For. Prod. J. 24[9] : 104-106.
Sept. 1974.

Two processes, using segmented helical cutterheads and cross-grain knife planing, were combined on dimension stock and furniture panels. In addition to an expected reduction in noise, the cutters produced satisfactory surfaces on the dimension stock and furniture panels and high-quality particles for particleboard. The particleboard manufactured from the flakes has high strength and good linear stability.

12

SCREW WITHDRAWAL RESISTANCE OF TYPES A AND AB SHEET METAL SCREWS IN PARTICLEBOARD AND MEDIUM-DENSITY HARDBOARD

By M.J. Superfesky.
USDA Forest Service
Research Paper FPL 239. 1974.

How does type AB, a relatively new sheet metal screw, compare with older type A when used with particleboard and medium-density hardboard?

For both types of board, face withdrawal resistance was less for AB screws. Results for edge withdrawal in particleboard were erratic because of differences in makeup of center portions of boards. In hardboards, average face and edge withdrawal resistance of type AB screws was about 10 percent less than that of type A screws.

13

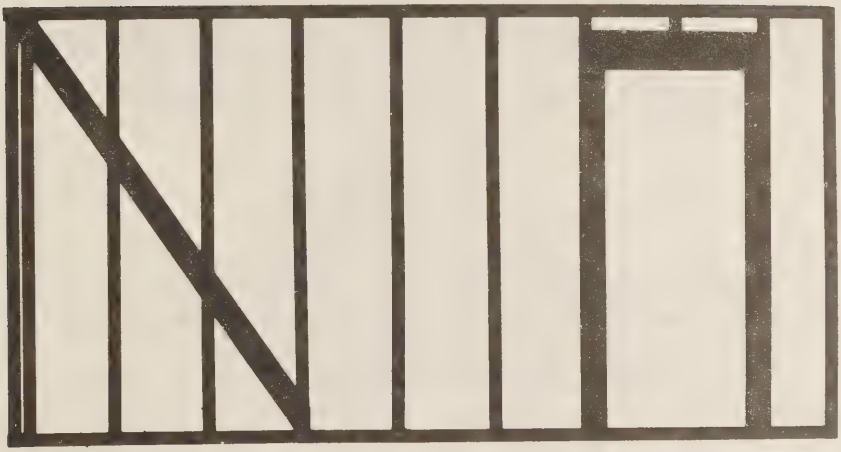
OAK-COTTONWOOD PLYWOOD — MINIMUM CURE TIME

By Ronald W. Jokerst and John F. Lutz.
USDA Forest Service
Research Paper FPL 231. 1974.

To make better use of low-grade species, a plywood is being developed to use low-quality oak and low-density species.

In bonding oak-cottonwood exterior plywood with a low-solids phenolic adhesive, the objective was to determine how much cure time could be reduced and still produce acceptable bonds. Satisfactory results were achieved with 4-minute cure time. Hot stacking might further reduce the time in press.

CONSTRUCTION



14

SIMPLIFIED DESIGN PROCEDURE FOR GLUED-LAMINATED BRIDGE DECKS

By William J. McCutcheon and Roger L. Tuomi.
USDA Forest Service
Research Paper FPL 233. 1974.

An innovation in timber bridge design is the glued-laminated panel deck, of vertically laminated panels up to 4 feet wide, placed transversely to the bridge stringers.

Most bridges are designed in accord with the specifications of the American Association of State Highway Officials in which only three distributions of wheel load are considered. Design curves developed at this Laboratory have been reduced to simple equations. The equations, in turn, can be used when designing decks for the three standard truck loads of the Association.

Bridge designers will find the equations simplify computing moments and shears for glued-laminated decks.

15

DESIGN CRITERIA FOR LARGE STRUCTURAL GLUED-LAMINATED TIMBER BEAMS USING MIXED SPECIES OF VISUALLY GRADED LUMBER

By R.C. Moody.
USDA Forest Service
Research Paper FPL 236. 1974.

Glued laminated beams, using multiple species in a single assembly, have potential to stretch high-grade timber supplies, if desired strength and stiffness can be maintained.

A theoretical concept permitting combinations of different pieces within the same beam has been developed and evaluated. Twenty large beams manufactured with outer laminations of visually graded Douglas-fir and inner laminations of lodgepole pine attained desired bending strength and stiffness.

Design criteria presented can be used to determine the extent that lower strength species can be used and the effect on beam properties.

16

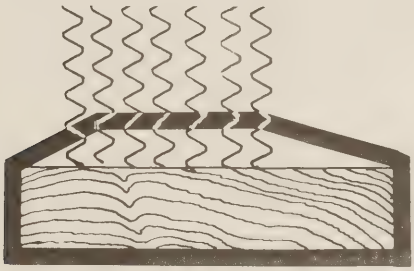
BENDING STRENGTH AND STIFFNESS OF BRIDGE PILES AFTER 85 YEARS IN THE MILWAUKEE RIVER

By B.A. Bendtsen.
USDA Forest Service
Research Note FPL-0229. 1974.

A question frequently asked is "How suitable for structural use is wood that has been submerged for many years in water or used underground?"

After an 85-year exposure in the Milwaukee River, red pine material had substantially lower strength and stiffness values than those published for the species. White pine and tamarack material showed little or no effects. A more extensive study is underway.

DRYING



17

HOW TO REDUCE ENERGY CONSUMPTION IN KILN-DRYING 4/4 HARDWOODS AT HIGH TEMPERATURES

By E.M. Wengert.
USDA Forest Service
Research Note FPL-0228. 1974.

Some 75 trillion Btu's of energy are now used to kiln-dry lumber. Fortunately, some steps can be taken to reduce the petroleum-based energy consumed in commercial kiln-drying lumber.

A most profitable measure to reduce energy used in kiln drying is to air-dry wood before drying it in a kiln. A suprisingly large amount of moisture can be removed from green lumber in just a few days of air-drying: For each percent of moisture lost in air drying, the energy savings in subsequent kiln drying is roughly 50 to 85 Btu's per board foot. Twenty-five suggestions are given that will reduce the energy now used to commercially kiln- and air-dry lumber.

18

MAXIMUM INITIAL MOISTURE CONTENTS FOR KILN-DRYING 4/4 HARDWOODS AT HIGH TEMPERATURES

By E.M. Wengert.
For. Prod. J. 24[8] : 54-56.
Aug. 1974.

Saving the Nation's energy supply continues to be important.

Many softwood species of the United States are successfully dried at high kiln temperatures — above 212° F. Drying times are short, energy costs low, and quality is good.

Moisture contents for successful high-temperature drying are reported for 12 commercially important U.S. hardwoods. Nine of the species were dried green from the saw at 212° F in approximately 2 days. Compared to conventional drying, this was a savings of a week or more in drying time.

19

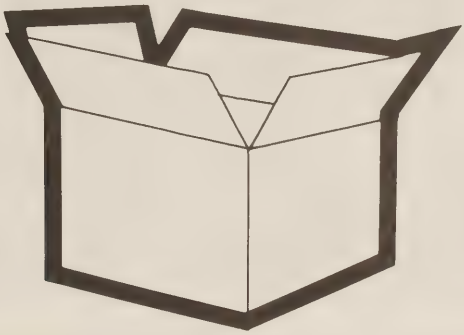
A "PINNED" STICKER TO REDUCE CROOK IN KILN-DRYING LUMBER

By E.M. Wengert and R.C. Baltes.
For. Prod. J. 24[8] : 23, 24.
Aug. 1974.

Warp during kiln-drying lumber can cause economic loss by reducing the grade of some species and sizes of lumber. Crook, a form of warp, frequently occurs in lumber from small-diameter trees and from veneer cores.

Crook was reduced in southern pine studs by inserting metal pins vertically through kiln stickers.

PACKAGING



20 THERMAL RESISTANCE OF CORRUGATED FIBERBOARD

By T.J. Ramaker.
Tappi 57[6] : 69-72.
June 1974.

A method to estimate how long the internal temperature of a corrugated container will be maintained in any weather conditions means profits for manufacturer and shipper.

Savings for products and reductions in costs of packaging can result from this work on thermal resistance of corrugated fiberboard.

A formula was developed as were curves that show thermal resistance of various weights and thicknesses of corrugated fiberboards. The information may be used to design containers for products for which temperature control is highly important.

21

CORRUGATING MEDIUM FROM HOUSEHOLD TRASH

By A.A. Mohaupt and J.W. Koning, Jr.
Tappi 57[11] : 56-58.
Nov. 1974.

To use our wood resource to a greater extent, a method was developed at the Forest Products Laboratory to make it possible to recover wood fiber mechanically from household trash. The technical feasibility of using part of the large volume of this recovered wood fiber in the furnish of corrugating medium was investigated.

By blending the recovered fiber with equal parts of neutral sulfite semichemical pulp or by treating a 100 percent reclaimed fiber medium with 0.9 percent starch, a corrugating medium was produced that was satisfactory both for runnability and for bonding.

22

PAPERMAKING FACTORS THAT INFLUENCE THE RUNNABILITY OF CORRUGATING MEDIUM

By John W. Koning, Jr., and D.J. Fahey.
Tappi 57[6] : 65-68.
June 1974.

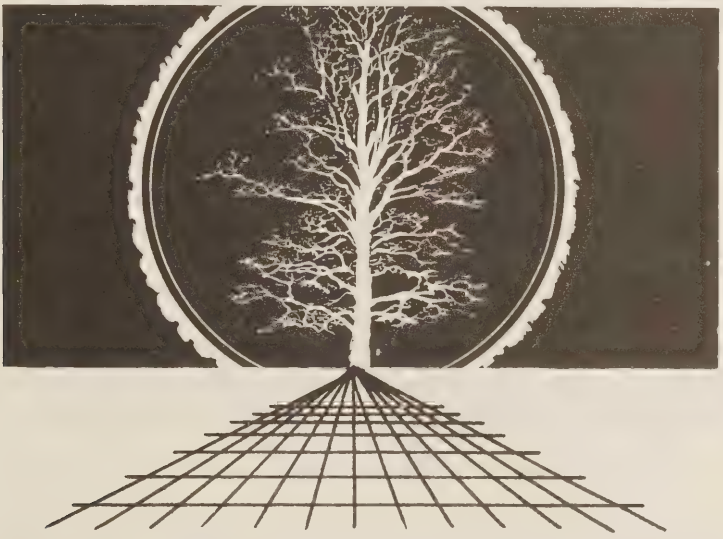
Fracturing the corrugating medium during fluting limits production speed and results in an inferior product.

The ability of a corrugating medium to form uniformly, to bond to a linerboard, or to be fluted without fracturing is termed "runnability."

Runnability is reported increased by removing shives, increasing disk refining, adding sulfite pulp, and reducing draws on the paper machine. Thus, faster speeds can be achieved for greater production of the medium.

This information is of benefit to manufacturers of corrugated medium to overcome process problems and provide the consumer with a better container.

PROJECTIONS



23

RESPONSE OF A PUBLIC RESEARCH LABORATORY TO CHANGING NEEDS

By H.O. Fleischer.
For. Prod. J. 24[9] : 49-51.
Sept. 1974.

How important will wood, our only major renewable material resource, become in the immediate future? Wood, not only abundant and versatile, is low in energy demands for processing and use. This contrasts with nonrenewable materials, petroleum, steel, aluminum, of growing economic scarcities.

To offer the most benefit to the public, research at the Forest Products Laboratory has been restructured into a systems approach. Scientists from a variety of specialties are working together on a particular objective, that is doing all the research needed for a total processing system from resource material to consumer product.

The systems approach coupled with increased communication with industry on research needs can close the gap in time between research accomplishments and application.

24

FOREST RESIDUES — THE TIMELY BONANZA

By H.E. Wahlgren.
Tappi 57[10] : 65-67.
Oct. 1974.

In this era of pending energy shortages plus concern for the environment, what can be done to extend our timber supply?

This article discusses how to improve efficiency in manufacturing; how to more fully utilize each harvested tree; how to develop improved products and processing systems; how to use forest residues; and how to protect wood products in use.

Of these, optimum use of our forest residues is seen to have the greatest potential for extending the Nation's timber supply.

PROTECTION

25 INORGANIC SURFACE TREATMENTS FOR WEATHER-RESISTANT NATURAL FINISHES

By John M. Black and Edward A. Mraz.
USDA Forest Service
Research Paper FPL 232. 1974.

The answer to many a homeowner's longtime desire is here — a clear coating for wood that resists weather and has a service life of 5 years or more.

An aqueous solution of inorganic chemicals is brushed on the wood surface to protect it from photodegradation. Then a resin coating, such as methyl silicone, that is transparent to ultraviolet light is added.

The coating will improve wood as a base for finishing, eliminate the need for special prime coats to control extractive staining, and lengthen the life of both wood and finishes.

26
TREATABILITY OF COAST DOUGLAS-FIR PRESS-LAM

By J.L. Tschernitz, V.P. Miniutti, and E.L. Schaffer
AWPA Proc. 1974, 17 pp.

Press-Lam is a structural product of thick veneer parallel-laminated wood that was developed at the U.S. Forest Products Laboratory. It offers high yield from low-grade softwood logs, greater uniformity of properties, and can be almost any dimension independent of log geometry.

How treatable are large Press-Lam sections of Coast Douglas-fir, a species normally difficult to treat indepth if heartwood is the major material?

This work shows that a broad range of creosote retention can be achieved easily in various treatment schedules. The treatability is related to lathe checks that enhance the penetration of preservative.

27
EFFECT OF FIRE-RETARDANT IMPREGNATIONS ON WOOD CHARRING RATE

By Erwin L. Schaffer.
J. Fire and Flammability, Fire Retardant Chem. Suppl.
Vol. 1 : 96-109. May 1974.

An area of continuing interest in extending our timber supply is reducing losses of wood products by fire.

Fire-retardant treatments are being used increasingly to reduce surface flammability of wood products, particularly for components in housing and building construction, for models and dies, for furniture and cabinets.

It is known that fire-retardant treatments reduce surface flammability of wood. However, it has not been known if charring rate, so important to wood performance during fire, is affected by the treatments.

Some of the chemical treatments impeded charring rate as compared to that of untreated wood. None of the chemicals examined increased charring rate of treated southern pine compared to untreated.

28

RATE OF HEAT RELEASE FROM WOOD-BASE BUILDING MATERIALS EXPOSED TO FIRE

By John J. Brenden.
USDA Forest Service
Research Paper FPL 230. 1974.

Data on "rate of heat release" from wood and wood-base materials have been suggested as a means of defining combustibility of materials for building code regulations. These would be used as a base to replace the present "noncombustibility" requirements.

Rates of heat release were determined in a furnace developed at this Laboratory for various wood building materials. Results indicated that fire-retardant treatment of wood greatly reduced the maximum rate of heat release.

A potentially useful measurement of combustibility is provided as is additional information on fire performance of wood-base building materials.

29

DEGRADATION OF WOOD BY PRODUCTS OF METAL CORROSION

By A.J. Baker.
USDA Forest Service
Research Paper FPL 229. 1974.

Why does metal corrode in wet wood? What are the products formed? What can be done to prevent corrosion in an effort to extend the timber supply?

Corrosion that causes wood deterioration around metal has long been a problem in wet wood. Examples are seen in rail ties, wood vessels, and exposed wood construction. In this report, the causes of metal corrosion are described and several methods are included for prevention.

30

CATABOLISM OF ASPEN SAPWOOD *RETICULITERMES FLAVIPES* [ISOPTERA: RHIMOTERMITIDAE]

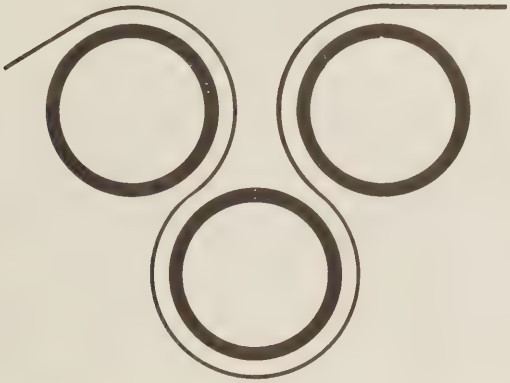
By G.R. Esenther and T.K. Kirk.
Ann. Entomol. Soc. Am. 67[6] : 989-991.
Nov. 1974.

Subterranean termites, predominantly the genus *Reticulitermes,* cause most of the termite damage to wood structures in the United States. However, little is known of their nutritional needs.

For better understanding that will lead to control measures, this study investigates how the termite *Reticulitermes flavipes* digests aspen sapwood.

The chemical analysis of the principal wood components and nitrogen in the termite-wood system showed that almost all of the cellulosic element was used, but little if any of the lignin. Nitrogen loss in the termite-feeding system was so great that it will be difficult to assess the importance of the newly discovered nitrogen-fixation in termites.

PULP AND PAPER



31

RECYCLED FIBER PROPERTIES AS AFFECTED BY CONTAMINANTS AND REMOVAL PROCESSES

By John H. Klungness.
USDA Forest Service
Research Paper FPL 223. 1974.

The potential market for recycled fibers should increase if the quality of these fibers is improved. But how do contaminants and their removal processes affect fibers?

Five contaminants applied to a kraft pulp or a kraft paper were removed by conventional processes. The processes affected the fibers, thus the sheet properties were affected as well.

Fiber bonding and strength were restored to their initial values by mild sodium hydroxide treatment as typically used for removing polyethylene and inks.

32
WEB SHRINKAGE ENERGY: AN INDEX OF NETWORK FIBER BONDING

By Von L. Byrd.
Tappi 57[6] : 87-91.
June 1974.

To date no satisfactory method has been available for evaluating fiber-to-fiber bonding, a property important to the strength of paper.

A useful fiber bonding index is described that is free of the limitations of other methods and that offers new insight on the potential properties of cellulose-base fiber networks.

Web shrinkage energy — the energy absorbed by a paper web during drying — was calculated from web shrinkage-contraction measurements during drying of alpha pulp handsheets and cellophane film. From this energy and sheet density, the index was developed.

33
A NEW CONCEPT IN PAPER THICKNESS MEASUREMENT, AN EXTENDED ABSTRACT

By V.C. Setterholm.
Tappi 57[3] : 164.
Mar. 1974.

Determining paper thickness by standard methods often is not suitable for calculating density or stress-strain properties of paper because the effect of surface roughness is not assessed adequately. A new definition of thickness, "effective thickness," is introduced from simultaneous solution of expressions for flexural and extensional stiffness.

For routine laboratory evaluations, a simple dial-type micrometer can be modified to give values equivalent to "effective thickness."

34

FACTORS INFLUENCING THE PROPERTIES OF OXYGEN PULPS FROM SOFTWOOD CHIPS

By J.L. Minor and N. Sanyer.
Tappi 57[5] : 120-122.
May 1974.

Pulping with oxygen offers great potential to eliminate the air pollution associated with kraft pulping. To optimize pulping conditions, the effect of temperature, liquor alkalinity, and chip size were evaluated. The objective was to maximize cooking uniformity, pulp yield, and quality. Pulp strength, typically low in tear and folds, was improved by including iodide in the pulping liquors.

35

PERFORMANCE OF STRATIFIED SHEETS

By Volker E. Stöckmann.
Tappi 57[10] : 108-110.
Oct. 1974.

Conventional manufacturing processes for paper can result in variation in density in the thickness direction. Thus there are strength differences caused by variation in the bonding-intensity profile.

A sheet mold was built so that it could form a stratified sheet in which intensity of bonding would be varied by selecting different pulps for each layer. For certain uses a stratified sheet performed better than a uniform sheet. This tool allows for designing paper for a particular end use.

36

INFLUENCE OF METAL AND IODIDE IONS IN OXYGEN PULPING OF LOBLOLLY PINE

By L.L. Landucci and N. Sanyer.
Tappi 57[10] : 97-100.
Oct. 1974.

New pulping processes for more complete and economic use of wood fiber or chemical raw material while protecting the environment is assuming great importance. Replacing sulfur with oxygen in conventional pulping shows promise as a relatively pollution-free method of pulping. However, use of molecular oxygen has limitations; measures were taken to minimize them.

Adding trace amounts of manganous ions increased the selectivity and the rate of pulping of fiberized wood and allowed lower oxygen pressures to be used. Iodide ions protected carbohydrates and increased viscosity. These results have significant bearing in developing a single-stage, relatively pollution-free oxygen-pulping process.

HIGHLY TECHNICAL

CHEMICAL

37

CHEMICAL COMPOSITION OF FAST-GROWTH JUVENILE WOOD AND SLOW-GROWTH MATURE SYCAMORE AND COTTONWOOD

By Wayne E. Moore and Marilyn J. Effland.
Tappi 57[8] : 96-98.
Aug. 1974.

A difference of 2 or 3 percent in either carbohydrate or lignin in wood can mean an annual difference of hundreds of tons of products and thousands of dollars in production costs.

The chemical composition of fast-growth juvenile wood is compared with that of slow-growth mature sycamore and cottonwood, both fast-growing species of interest to plantation growers. Hydrolyzates from material of both species contained high levels of xylose and lower than normal amounts of glucose. Lignin content in both species was higher in the slow-growth than in the fast-growth wood.

38

DEMETHYLATION OF 2,4,6-TRIMETHOXYPHENOL BY PHENOL OXIDASES: A MODEL FOR CHROMOPHORE FORMATION IN WOOD AND PULP

By John M. Harkin and John R. Obst.
Tappi 57[7] : 118-121.
July 1974.

The source of intrinsic color of wood and the causes of stains in pulp are of major concern to the industry. Demethylation via enzymic phenol oxidation was investigated with 2,4,6-trimethoxyphenol as a model, and properties of the products were examined to assess the importance of quinonetype structures as wood and pulp chromophores. Decomposition of quinonoid groups in lignin during pulping gives rise to strong chromophores that would stain pulp and discolor spent liquors.

39

LIGNANS, THE MAJOR COMPONENT OF RESIN FROM *ARAUCARIA ANGUSTIFOLIA* KNOTS

By Robert J. Anderegg and John W. Rowe.
Holzforsch. 28[5] : 172-175.
Oct. 1974.

Parana pine (*Araucaria angustifolia*) is an important source of lumber in Brazil. Its resin is used in flexographic inks, plastic laminates, furniture varnishes, and as a partial substitute for phenolic resins. Ninety percent of the resin from knots of this pine was a mixture of lignans, predominantly of the guaiacyl type.

40

A MODIFIED ISOPIESTIC METHOD FOR ADSORPTION OF WATER AT HIGH RELATIVE VAPOR PRESSURE

By Richard C. Weatherwax.
J. Colloid and Interface Sci. 48[3] : 518,519.
Sept. 1974.

This modified method for adsorption of water at high relative vapor pressure will be helpful to increase understanding of drying and treating of the wood cell wall. On a broader scale, how the cell wall performs, is how the wood performs during drying and treating.

BIOLOGICAL

41

DENDROCORTICIUM AND *DENTOCORTICIUM*, GEN. NOV. [APHYLLOPHORALES, CORTICIACEAE] AS SEGREGATES FROM LAETICORTICIUM

By M.J. Larson and R.L. Gilbertson.
Nor. J. Bot. 21 : 223-226.
1974.

On the basis of basidial development, the genera *Dendrocorticium* and *Dentocorticium* are segregated from *Laeticorticium*. *Dentocorticium* is proposed for the species that do not possess probasidia and *Dendrocorticium* for the species previously placed in *Laeticorticium* that undergo metabasidial elongation in the subhymenial region in forming their basidia and also possess distinctive smaller spores.

42

USE OF SYRINGALDAZINE FOR DETECTION OF LACCASE IN SPOROPHORES OF WOOD-ROTTING FUNGI

By J.M. Harkin, J.J. Larsen, and J.R. Obst.
Mycol. 66[3] : 469-476.
1974.

Detection of laccase in decayed woody tissue serves as an aid in identifying the two major types of wood-rotting fungi, the white rot and the brown rot. Laccase production also aids in identifying the specific fungus. Syringaldazine is shown to be a rapid and more reliable and specific reagent for detecting fungal laccase than existing phenolic substrates.

43

GUAIACYL LIGNIN ASSOCIATED WITH VESSELS IN ASPEN CALLUS CULTURES

By Karl E. Wolter, John M. Harkin, and T. Kent Kirk.
Physiol. Plant. 31 : 140-143.
1974.

Evidence is added to the concept that the different lignin types in hardwood are compartmentalized according to cell types. This makes it feasible to predict the amounts of guaiacyl or syringyl lignin in a given species based on cell composition.

44

A NEW SPECIES OF *PLATYGLOEA* OCCURRING ON *PENIOPHORA TAMARICICOLA* IN ARIZONA

By Harold H. Burdsall, Jr., and R.L. Gilbertson.
Mycol. 66[4] : 702-706.
July-Aug. 1974.

After observing pustules of a fungus growing on the hymenial surface of *Peniphora tamaricicola,* examination indicated they were fruiting structures of a *Platygloea* species unlike others known to parasitize basidiomycetes. Because the species is substantially different from any of the known *Platygloea* it is described here as new — *Platygloea mycophila* Burds. et Gilbertson, sp. Nov.

45

THREE NEW SPECIES OF PHANEROCHAETE [APHYLLOPHORALES, CORTICIACEAE]

By H.H. Burdsall, Jr.
Mycol. 66[5] : 780-790.
1974.

Three new species are proposed for the genus *Phanerochaete* (*Aphyllophorales, Corticiaceae*): *P. allantospora* found in Arizona; *P. arizonica,* found in Arizona and California; and *P. salmoneolutea,* in Arizona and Florida. All were on angiosperms, and were associated with a white rot of dead branches, fallen trees, and slash. A new combination in the genus *Phanerochaete* is proposed for *Peniophora cacaina.*

46

EVALUATION OF MODELS FOR PREDICTING TENSILE STRENGTH OF 2- BY 4-INCH LUMBER

By C.C. Gerhards and R.L. Ethington.
For. Prod. J. 24[12] : 4654.
1974.

Improvements in engineering efficiency is an important area by which the wood resource can be extended. Several mathematical models that offer potential criteria for grading tensile strength of lumber are evaluated by using three sample statistics.

Based on results of 287 machine-rated 2 by 4's, several mathematical models yielded prediction efficiencies of 52 to 58 percent without entailing more than the targeted 5 percent falldowns (actual strengths below the predicted).

47

ELASTIC BEARING CONSTANT OF WOOD: EFFECTS OF MOISTURE CONTENT CONDITIONS

By Thomas Lee Wilkinson.
USDA Forest Service
Research Paper FPL 235. 1974.

Information presented here will enable engineers to arrive at more efficient joint designs. Theoretical analyses have been developed to predict lateral resistance of two-member joints that incorporate a material constant, the elastic bearing constant. The effects of moisture content on solid wood members and changes in moisture content on elastic bearing constant are given here.

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